

**WHAT IS CLAIMED IS:**

1. A polyurethane obtained by the reaction of at least one isocyanate containing material and at least one compound having at least two hydrogen atoms capable of reacting with the at least one isocyanate, wherein said compound contains, as part of the compound, a thermally decomposable or a biodegradable hydroxyalkanoate, and said compound optionally having at least two hydroxyl containing terminal groups with different functionalities.

2. The polyurethane of claim 1, wherein said hydroxyalkanoate has a formula selected from:

- 10
- a)  $\text{HOCHR}(\text{CH}_2)_y\text{COO A OH};$
  - b)  $\text{H}\{\text{OCHR}(\text{CH}_2)_y\text{CO}\}_x\text{O A OH};$
  - c)  $\text{HOCHR}(\text{CH}_2)_y\text{COO A OOC}(\text{CH}_2)_y\text{CHROH};$
  - d)  $\{\text{HOCHR}(\text{CH}_2)_y\text{CO}\}_z\text{B};$  or
  - e)  $[\text{H}\{\text{OCHR}(\text{CH}_2)_y\text{CO}\}_x]_z\text{B};$

15 wherein R is hydrogen, a saturated alkyl group having from 1 to 16 carbon atoms or an unsaturated alkyl group having from 2 to 16 carbon atoms or mixtures thereof, wherein R is the same or different in each formula; A is  $(\text{CH}_2)_n$  or  $(\text{CH}_2\text{CHR}'\text{O})_m$ , where R' is hydrogen or methyl; m is from 1 to 50; n is 2 to 6; y is 0 to 3; x is 2 to 1000; and B is selected from:

20 trimethylol propane wherein z is 1, 2 or a mixture of 1 and 2,  
glycerol wherein z is 1, 2 or a mixture of 1 and 2,  
triethanolamine wherein z is 1, 2 or a mixture of 1, and 2, or  
sucrose wherein z is 1 to (p-1) where p is the number of free hydroxyl groups  
or derivatives present in said compound.

3. The polyurethane of claim 1, wherein said hydroxyalkanoate has a formula:

- a)  $\text{H}\{\text{OCHR}(\text{CH}_2)_y\text{CO}\}_x\text{O A O}\{\text{OC}(\text{CH}_2)_y\text{CHRO}\}_x\text{H}$

wherein R is hydrogen, a saturated alkyl group having from 1 to 16 carbon atoms or an unsaturated alkyl group having from 2 to 16 carbon atoms or mixtures thereof, wherein the R is the same or different in each formula; A is  $(CH_2)_n$  or  $(CH_2CHR'O)_m$ , where R' is hydrogen or methyl; m is from 1 to 50; n is 2 to 6; y is 0, 2, or 3 when A is  $(CH_2)_n$  or y is 0 to 3 when A is  $(CH_2CHR'O)_m$ ; and x is 2 to 1000.

4. The polyurethane of claim 1, wherein said hydroxyalkanoate is 3 hydroxybutyric acid combined with ethylene glycol, 1, 3 propane diol, 1,2 propane diol, 1,3 butane diol, 1, 4 butane diol, or combinations thereof.

5. The polyurethane of claim 1, wherein said hydroxyalkanoate is 3 hydroxybutyric acid combined with polyethylene glycol having from about 1 to about 100 ethylene glycol repeat units.

6. The polyurethane of claim 1, wherein said hydroxyalkanoate is a mixture of 3 hydroxybutyric acid and 3 hydroxyvaleric acid combined with ethylene glycol, 1, 3 propane diol, 1,2 propane diol, 1,3 butane diol, 1, 4 butane diol, or combinations thereof.

7. The polyurethane of claim 1, wherein said hydroxyalkanoate is a mixture of 3 hydroxybutyric acid and 3 hydroxyvaleric acid combined with polyethylene glycol having from about 1 to about 100 ethylene glycol repeat units.

8. The polyurethane of claim 1, wherein said isocyanate containing material is toluene diisocyanate, methylene 4, 4' diphenyl diisocyanate, isophorone diisocyanate, hexamethylene diisocyanate, a combinations thereof.

9. The polyurethane of claim 1, wherein the weight ratio of isocyanate groups to hydroxy groups is from 0.5:1 to 2:1.

10. The polyurethane of claim 1, wherein the polyurethane is biodegradable.

11. The polyurethane of claim 1, wherein the polyurethane is hydrophilic.

12. The polyurethane of claim 1, wherein the polyurethane is hydrophobic.

13. The polyurethane of claim 1, wherein the polyurethane is a coating.
14. The polyurethane of claim 1, wherein the polyurethane is a flexible foam.
15. The polyurethane of claim 1, wherein the polyurethane is a rigid foam.
16. The polyurethane of claim 1, wherein the polyurethane is an elastomer.
- 5 17. The polyurethane of claim 1, wherein the polyurethane is water dispersible.
18. The polyurethane of claim 1, wherein the hydroxyalkanoate is a polymer of one or more subunits having the chemical formula:



wherein n is 0 or an integer, and wherein R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, and R<sup>4</sup>, which are the same or different, is  
10 selected from saturated and unsaturated hydrocarbon radicals; halo- and hydroxy-substituted radicals; hydroxy radicals; halogen radicals; nitrogen-substituted radicals; oxygen-substituted radicals; or hydrogen atoms.

19. The polyurethane of claim 1, wherein said hydroxyalkanoate is a polymer.
20. The polyurethane of claim 19, wherein said polymer is a homopolymer or  
15 copolymer.
21. The polyurethane of claim 19, wherein said polymer is a copolymer of 3-hydroxybutyric acid and 4-hydroxybutyric acid.
22. The polyurethane of claim 19, wherein said hydroxyalkanoate is a polymer of 3  
hydroxybutyric acid and 3 hydroxyhexanoic acid, or a polymer of 3 hydroxybutyric acid and 3  
20 hydroxyoctanoic acid.
23. The polyurethane of claim 19, wherein said hydroxyalkanoate is a polymer of 1,3 hydroxy butyric acid ; 1,4 hydroxy butyric acid, or both.
24. A method of making a polyurethane comprising reacting at least one isocyanate containing material and a compound having at least two hydrogen atoms capable of reacting

with the at least one isocyanate, wherein said compound contains, as part of the compound, a thermally decomposable or a biodegradable hydroxyalkanoate.

25. The method of claim 23, wherein said compound having at least two hydrogen atoms is primarily a mono ester.

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